Ch. 27 CW answers

#1 - cond. met

#2 - do cond.

*GROUP: CW27

(a)

Hypotheses:

H_0: $\beta_1 = 0$ (There is no association btw GPA's & ACT scores)

H_A: $\beta_1 > 0$ (There is a positive assoc. btw GPA's & ACT scores)

(2 pts)

Conditions:

1) SRS	1) Stated
2) Linear Data	2) The scatterplot is linear, no outliers
3) Independence	3) Each student's is indep. of each other.
4) Normal residuals	4) The normal prob. plot of the residuals is linear.
5) Equal Variance	5) Residual Plot shows no change in the spread (5 pts)

conditions met --> t-distribution --> Linear Regression t-test

(2 pts)

Mechanics:

$$t = \frac{b}{SE_b} = \frac{7.3970}{1.0873} = 6.803$$ (3 pts)

$P(t > 6.803 \mid df = 13) = 6.2837 \times 10^{-6}$ (p-value = 3 pts)
(df = 1 pt)

Conclusion:

We reject Ho because P-Value of 6.2837×10^{-6} is less than alpha of 0.05. We have sufficient evidence that the slope of the population regression line is greater than 0. Thus as GPAs increase, ACT scores increase as well.

(5 pts)

(b) Conditions met --> t-distrib --> LinReg T-interval (2 pts)

$b \pm (t^*)(SE_b) = (7.3970) \pm (2.160)(1.0873) = (5.0484, 9.7456)$ (3 pts)

We are 95% confident that the slope of the population regression line between GPA and ACT scores is between 5.0484 and 9.7456 points/point. (3 pts)

For every 1 point increase in GPA, the ACT scores go up on average by 5.0484 to 9.7456 points.

(c) r = 0.8836 (1 pt)

(d) Yes. The scatterplot is linear, the residual plot is scattered, and the correlation is strong. (4 pts)

(e) Strong, linear, positive (3 pts)

(f) $\widehat{ACT} = -0.427 + 7.397(3.25)$ (3 pts)

ACT = 23.613 points

(g) Residual = observed – predicted = 24 – 23.613 = 0.387 points

(2 pts)

TOTAL: 42 pts

2) **Hypotheses:**

$H_0: \beta_1 = 0$ (There is no association btw homework grade & midterm grade)

$H_A: \beta_1 \neq 0$ (There is an association btw homework grade & midterm grade)

(2 pts)

Conditions:

1) SRS	1) Stated random sample
2) Linear Data	2) The scatterplot is linear, no outliers
3) Independence	3) Each student's is independent of each other.
4) Normal residuals	4) The normal prob. plot of the residuals is linear.
5) Equal Variance	5) Residual Plot shows no change in spread.

(5 pts)

Conditions met --> t-distribution --> Linear Regression t-test

(2 pts)

Mechanics:

$t = \frac{0.7252}{0.0623} = 11.6371$ (3 pts)

$2*P(t > 11.6271 \mid df = 59) = 6.4908 \times 10\text{-}17$ (p-value = 3 pts) (df = 1 pt)

Conclusion:

We reject Ho because P-Value of 6.4908×10^{-17} is less than alpha of 0.05. We have sufficient evidence that the slope of the population regression line is not equal to 0. Thus as homework scores increase, midterm scores change.

(5 pts)

(b) Conditions met --> t distribution --> Lin Reg T- Interval

(2 pts)

$(0.7252) \pm (1.6711)(0.0623) = (0.62109, 0.8293)$

(3 pts)

We are 90% confident that the slope of the population regression line between homework grades and midterm grades is between 0.62109 and 0.8293 points/point.

(3 pts)

(TOTAL: 29 pts)

OVERALL TOTAL = 71 points